MONITORING & EVALUATION REPORT--2010

MCELMO CREEK UNIT
COLORADO RIVER SALINITY CONTROL PROJECT
USDA-NRCS

M&E EXECUTIVE SUMMARY
HYDROSALINITY

Project: McElmo Creek

- The project plan is to treat **21,550** acres with improved irrigation systems.

- To date, **12,681** acres have improved irrigation systems planned/applied.

- The project plan is to reduce salt loading to the Colorado River system by **46,400** tons of salt.

- In FY 2010, salt loading has been reduced by **1,175** tons/year.

The cumulative salt load reduction is **16,799** tons/year.

Cost effectiveness –

- The ***planned*** cost per ton of salt saved with prior year contracts is **$111.82/ton**. This is based on the following formula:

FA + TA = Total Cost X Amortization Factor = Total amortized cost
Total amortized cost divided by total annual tons salt saved = Cost/Ton

FA is total dollars obligated in EQIP & Parallel Program (including wildlife).
TA is 67% of the FA (This number includes education and monitoring).
Amortization factor for 2010 is **.06657**

Hydro Salinity Monitoring & Evaluation Summary

2010

- Irrigation Systems Applied Acres
  Acres Treated in 2010 = **615 Acres**
  Program totals = **6,732 Acres**

- Irrigation water conveyance delivery/ gated pipe
  Acres treated in 2010 = **237 Acres**
  Program Totals **= 2971 Acres**
  Average Efficiency = **50%**

- Sprinkler & Drip irrigation systems installed= **378 Acres**
  (Includes Linear, Center Pivot, Side Roll, & Big Gun)
  Acres treated in 2010 = **378 Acres**
  Program Totals = **3,761 Acres**
  Average Efficiency = **75%**

- **Overall Average systems efficiency**
  In 2010 = **65%**
  Cumulative = **64%**

MCELMO CREEK IRRIGATION MONITORING & EVALUATION
2010 REPORT
USDA & NRCS

Introduction

For numerous years, the Natural Resources Conservation Service (NRCS) has been applying improved irrigation systems and practices with cooperators in the McElmo Creek Salinity Control Area. This has occurred through the Colorado River Salinity Control Program including both Environmental Quality Incentives Program (EQIP) and Basin States Parallel Program Funding. All EQIP and Basin applications undergo a ranking process that yields the most cost-effective projects on cost per ton of salt saved. Monitoring and evaluation of the salinity levels has been critical to implementing and maintaining these programs. The McElmo Creek Monitoring & Evaluation Plan was established in August 1988 and revised April 1994. Monitoring of on-farm hydro-salinity was continued for five years from 1995-1999. Monitoring was suspended in 2000 because it was determined that the values were redundant from the previous five years. A revised hydro-salinity, monitoring plan was implemented in 2002. This plan included monitoring 2 sites per year and completing 20 interviews of participants to see how their irrigation systems were working.

The majority of the improved irrigation in the Cortez-Montezuma County (McElmo Creek) area is characterized by side-roll move sprinklers on gently rolling, wind-blown loess soils. The intake rates of the soils are generally medium to high. Previous irrigation was by very inefficient surface flow over the same soils. By converting the surface flow irrigation to side-roll irrigation, the efficiencies have been greatly increased. Hence, the deep percolation losses of water have been greatly lessened. It is anticipated that the trend of moving from flood irrigation to sprinkler irrigation will continue. This is primarily due to the increased development in the area. Large water rights and land parcels are being sold and split into multiple small ownerships. This division makes the large volume required for flood systems infeasible.

2010 Activities

Several activities were undertaken in 2010 to improve salinity management. The lower end of the Lone Pine lateral was put into a pipe. This generated gravity pressure and as a result we had 4 new contracts converting from flood irrigation to sprinkler and gated pipe.

A large emphasis was placed on irrigation water management. In 2010, 27 IWM plans where written on 592 acres of pasture and hayland and 1036 acres if IWM was applied. The IWM specialist held 2 half day classes where the fundamentals of IWM where taught. These classes also include some hands on teachings on how to test for soil moisture. A stronger effort was put forth to provide on farm one on one training of IWM. This included multiple pivot evaluations to ensure that systems were nozzled correctly and being operated at the correct speed for optimal efficiency.

Other activities included outreach to educate people about the salinity program and its benefits. Some of the activities included displays at the Four Corners Ag Expo, newspaper articles, and radio announcements. Work was also done with the local conservation districts and irrigation water districts to encourage large canals and ditches to consider converting to pipeline systems to reduce seepage and improve efficiency.

Future IWM Goals & Recommendations & Tasks

1. Future monitoring efforts should focus on the conversion of large agricultural tracts into smaller tracts to monitor the effects the change in land use has had on Salinity. Future monitoring efforts should also focus on maturing irrigation conservation practices to address their declining Irrigation efficiencies. This should include the investigation of cost-share methods to help producers adapt their existing systems to the new technologies, to bring these systems up to new NRCS Irrigation standards.
2. It is recommended that the Irrigation Water Management Specialists continue to provide assistance to the landowners during the first season of use, for the improved irrigation systems installed under the Salinity Program.
3. The Goal of IWM program is to provide the necessary assistance and information to help the Salinity Program achieve the level of

salinity reduction above what the program originally planned for. This IWM activity will provide the lacking and much needed follow up assistance and public relations, with the landowners to help them maximize their irrigation efficiencies and over-all success.

4. Utilizing and partnering with other skilled professionals like the CSU Extension, Irrigation Suppliers, Conservation District Boards, and Irrigation Districts can accelerate the Success of the IWM Program and its acceptance.

2011 OUTLOOK

Several major endeavors are being planned or implemented in 2010. The conversion of a large supply canal, the rest of the lower end of the Lone Pine Lateral, to a piped system occurred in 2011. It is anticipated that this pipeline will aid tremendously in increasing the amount of on farm projects. It is anticipated that there will be a large amount of conversion from flood to sprinkler irrigation because the pressure generated from the pipelines will allow sprinklers to function without the added cost of pumping. We are currently planning 6 such projects on the lower end of the Lone Pine. The recession, low hay prices, and higher input cost have made farmers apprehensive about signing contracts for irrigation improvements. There are still a lot of irrigation improvements to make and our outreach efforts have been increased. I think the number of contracts will be down by about one half as a result of the recession. I believe the pace will pick up once we are out of this economic downturn.

Continued improvement of the IWM program offered by the NRCS is planned Documentation of soil infiltration rates under sprinkler irrigation with consideration of current field status of tillage, crop residue, and available water holding capacity of soil profile will be accomplished by means of an infiltrometer. Increased accuracy of surface irrigation systems will result from flow metering devices. Monitoring of salinity issues will now be available to the area to identify and target control problem areas. Special emphasis is planned for areas in McElmo Canyon where potential salt problems are higher. Efforts are also underway with the cooperation of the local conservation districts to obtain an automated weather station to provide a local and more accurate source of ET data for agricultural producers to use when scheduling their irrigations. All of this equipment will

also afford the chance to offer services and data never available to the area before.

Monitoring of projects in O&M phase of contracts will be expanded. Especially with the trend of sub-dividing old large farms and ranches into “ranch-etts”, IWM assistance will be critical to maintaining good water management to ensure water quantity and quality for all users.

Part 2. M&E EXECUTIVE SUMMARY- McElmo WILDLIFE

HEP/HSI Data involving accomplishments made by I-EQIP, EQIP, WHIP and parallel program
1996-2010

Species	**Cumulative HUV's 2009**	**Cumulative HUV's 2010**	**Net Change for 2010**
	(Applied)	(Applied)	
Pheasant	- 935.05	- 1024.52	- 89.47
Mallard Winter	+ 239.57	+ 257.36	+ 17.79
Mallard Breeding	-2333.00	-2553.79	- 219.79
Yellow Warbler	- 47.42	- 51.70	- 4.28
Meadow Vole	- 282.20	- 310.16	- 27.96
Marsh Wren	+ 193.5	+ 206.45	+ 12.95
Screech Owl	- 134.17	- 138.10	- 3.93
Snipe	+ 36.19	+ 38.07	+ 1.88

Acres of Wildlife Habitat Applied 1990-2010

	Cumulative acres 2009	Cumulative acres 2010	Net change for 2010
Upland	**844.6**	**844.6**	**0.00**
Wetland	**436.69**	**444.94**	**8.25**

Wetland Data 1996-2010

Cumulative acres impacted year 2009	Cumulative acres impacted year 2010	Cumulative AREM Unit change 2009	Cumulative AREM Unit change 2010	Net change in 2010
245.73	**256.03**	**+ 11.162**	**+19.522**	**+8.36**

Funding for Wildlife Habitat 1990-2009

% of total funds spent on wildlife through 2009	% of total funds spent on wildlife through 2010
4.32%	**4.61%**

The McElmo Unit wetland data reflects cumulative changes (impacts) to wetland AREM scores. The net change in 2010 shows the cumulative impact of implementation (practice application) of enhancement and losses resulting from irrigation improvements completed that year. The funding percentages changed this year due to re-evaluation of all contracts and elimination of those cancelled (since the 2008 audit) from the database.

Projected HSI values have remained consistent with past years except for the fact that most of our contracts have now been applied (due to increased efforts by our engineering staff and the use of Technical Service Providers).

M&E REPORT, WILDLIFE

HISTORY

PROJECT SETTING

The McElmo Creek Unit, known locally as the Montezuma Valley, is in the southwest corner of Colorado within Montezuma County. The City of Cortez, centrally located in the project area, is at an elevation of 6200 feet above mean sea level. The McElmo Creek watershed originates in the lower foothills of the LaPlata Mountains to the East. Its north boundary is the Dolores River Canyon Rim and the South by Mesa Verde and the Ute Mountain to the Southwest. McElmo Creek is a tributary to the San Juan River.

The McElmo Creek basin, having a limited watershed area, is a relatively dry basin under natural conditions. Montezuma Valley Irrigation Company (MVIC), the major user and distributor of irrigation water, diverts approximately 116,000 acre feet of Dolores River water annually (1957-1973 data) into the Montezuma Valley. Diverting water from McPhee reservoir on the Dolores River through a tunnel and extensive canal system, MVIC presently distributes water to approximately 29,000 acres. Return flows from irrigation and municipal discharges constitute most of the continuous channel flow in McElmo creek.

Mancos Shale underlies much of the Montezuma Valley. This shale is of marine origin with a high salt content, and provides the main salt source for the return flow into McElmo Creek. Excessive irrigation and seepage from delivery systems cause deep percolation. This water dissolves salts, which move downward until they reach McElmo Creek, then the San Juan River, and finally the Colorado River.

The farmland elevation ranges from 5,800 to 7,000 feet. The annual precipitation is nearly 12 inches, including snowfall.

METHODS

The Habitat Evaluation Procedures (HEP) were used on six alternative plans including future without. An interagency team determined the change of Habitat Unit Values (HUV) for all the alternatives. Eight wildlife species models were used, representative of the ten prevalent cover types in the study area (see list below).

SPECIES

- marsh wren
- mallard-winter
- mallard-breeding
- ring-necked pheasant
- great-horned owl
- yellow warbler
- meadow vole
- common snipe.

COVERTYPES

- Cropland (AC)
- Annual Herbland (ANNHERB)
- Perennial Herbland (PERHERB)
- Woodland (WOODY)
- Pasture and Hayland (AP)
- Native Rangeland (SSSB)
- Orchards and Vineyards (AO)
- Palustrine Emergent Wetlands (PEM)
- Streams, Rivers and Canals (RIVERSn)
- Lakes, Ponds and Reservoirs (LAKESn)

NRCS also conducted a wetland inventory between 1979 and 1980. These wetlands were mapped, classified according to Circular 39 and the Cowardin System for Classification of Wetlands and Deepwater Habitats, and given a wildlife value rating using a system developed by Francis Golet (which gives wetlands a numerical value). This system rates factors such as water regime, wetland class richness, size and juxtaposition.

AVIAN RICHNESS EVALUATION PROCEDURES (AREM)

Paul R. Adamus developed this evaluation method in cooperation with the Environmental Protection Agency for use in the "lowland wetlands of the Colorado Plateau" (specifically the Salinity Control Units in Utah, Colorado and Wyoming).

In 1994 the State of Colorado Natural Resources Conservation Service decided to adopt AREM for evaluating wetland impacts in the McElmo Creek, Lower Gunnison and Grand Valley salinity control units.

Evaluation of all McElmo Creek salinity contracts used this method.

Values were obtained by averaging the "six habitat scores weighted by species," multiplied by .01, and then multiplied by the acres to obtain unit values. Approximately 103.8 net wetland acres of the 615 acres projected in the EIS have been lost. Through creation of new and enhancement of existing wetlands we have perceived a net gain of 22.4 value points.

HABITAT EVALUATION PROCEDURES (HEP)

Since 1997, we have discontinued wildlife tracking and monitoring measures as outlined for the salinity program. In 1999, due to increased workloads and a 75% reduction in staff, we chose to track cost-share, acres and wildlife practices for EQIP salinity. A statistical analysis of HEP data (collected through 1998) was conducted to determine adequate sample size needed to calculate mean habitat suitability indices (HSI) with 95% confidence. The calculated mean is within + or -.1 of the real mean. Data from 1999 and 2001 was also collected, desired sample sizes were achieved, and mean HSI values calculated for each wildlife species (for contracts with and without wildlife practices). Habitat Unit Values (HUV's) were then calculated by multiplying HSI's by HUV's, to estimate project impacts.

WILDLIFE PRACTICES

Wildlife practices implemented to improve or develop upland and wetland wildlife habitat have changed over the years, mainly to reflect certain constraints and NRCS priorities (as well as those of the various agencies charged with oversight). We have eliminated the practice of pothole blasting in wetlands due to the continued encroachment of dwellings and the limited effectiveness. Pond construction has been limited by the Division of Water Resources permitting process and the limited values achieved by the practice. If shallow water is designed into the practice it becomes more effective. But the permitting process also limits shallow water construction. Management practices such as rotational grazing, setting aside alfalfa for nesting and small grain for food are not popular practices in the area.

The following practices are used effectively within the study area:

- Grass/legume cover plantings for upland nesting and roosting
- Shallow water developments for waterfowl and shorebird feeding and resting
- Tree and shrub plantings for upland wildlife nesting, roosting and food
- Fencing to exclude livestock grazing either permanently or during critical use periods
- Bioengineering practices to improve or protect riparian habitat
- Occasional development of irrigation to improve forage quality for wildlife
- Brush management to enhance under story in pinon/juniper stands.

1990-1996

The following four tables summarize the data tracked from one hundred and three (1990 through 1996) contracts. All contracts have been applied and these figures represent our best assessment of impacts.

Table 1

1990-1996 Wetland Impacts
(Acres/Values)

Type	Existing		Applied		Change	
	Acres	Value	Acres	Value	Acres	Value
1	5.08	0.84	2.30	.54	-2.78	-.30
2	203.76	82.60	112.7	76.41	-91.10	-6.20
3	106.3	47.94	106.9	72.81	+.57	+24.87
4	10.80	5.95	9.30	7.95	-1.50	+.20
5	10.40	8.35	28.50	16.19	+10.10	+7.84
6	46.85	19.68	41.49	19.48	- 5.36	-.20
9	24.20	4.73	11.20	.87	-13.70	-3.86

Table 2

1990-1996 Cover Type Changes (Acres)

Cover	Exist	Apply	Change
AC	.00	109.97	+109.97
ANNHERB	327.90	189.70	-138.20
AP	2963.50	3118.3	+154.80
LAKESn	25.80	37.10	+11.30
PEM	375.20	259.60	-115.60
PERHERB	146.50	198.20	+51.70
SSSB	172.60	115.3	-57.30
WOODY	299.40	275.90	-23.50
AO	12.30	9.70	- 2.60

Table 3

1990-1996 HUV Summary (Values)

Species	Existing	Applied	Change
Pheasant	3585.50	3484.70	- 99.80
Warbler	51.33	43.21	- 8.12
Mallard	4074.00	4552.40	+478.40
Breeding			
Mallard	6.6	97.75	+ 91.15
Winter			
Vole	873.40	866.93	- 6.47
Wren	101.73	143.75	+ 42.02
Owl	3235.43	2956.68	- 278.75
Snipe	326.33	259.43	- 66.90

Table 4
(Replacement Summary-Applied 1990-1996)

Practices	Planned	Applied
Cover Plantings	74.9 ac	36.68 ac
Fencing	85,465 ft	53,785 ft
Pipelines	538 ft	507 ft
Tree/shrub Plantings	18.22 ac	8.86 ac
Sprinklers	240 ft	160 ft
Wildlife Upland Habitat Management	277.84 ac	152.9 ac
Shallow Water Development (includes Ponds)	18.43 ac	15.94 ac
Potholes	42	25
Wildlife Wetland Habitat Management	294.74 ac	297.3ac

1996-Present

Since 1997 we have discontinued wildlife tracking and monitoring measures as outlined for the salinity program. Currently we are tracking cost-share, acres and wildlife practices planned and applied. WHIP planning efforts within the priority unit were also recorded. The following table reflects wildlife habitat planning and application activity between 1996 and 2010 under Interim-EQIP, EQIP, WHIP and the Basin States Parallel Program.

Table 5

	ft.	ac.	ac.	ft.	ac.	ac.	ft.	no.	ac.	ac.	ac.	ac.
	Gated	Brush	burn	fence	cover	Shrub	Pipe	pond	grazing	upland	wetland	Forest
	Pipe	Mgt.			plantings	Plantings	lines		mgt.	mgt.	mgt.	Stand imp.
Planned	8,284	34.4	20	18,419	244.06	11.59	18,004	9	565.5	616.3	184.2	33.6
Applied	4,334	24	5	15,758	200.75	6.23	20,520	6	156.7	506.5	137.39	33.6

The following table is a compilation of long term impacts (Using the Avian Richness Evaluation Method) to wetlands associated with salinity control measures, including wetland habitat creation or enhancement, occurring between 1996 and 2010. Overall impacts have been positive. Protection and enhancement of larger riparian areas along stream corridors is beginning to gain popularity. This focus will hopefully allow us to compensate for losses from large canal piping projects which we are now embarking on.

Table 6

					AREM-1997-2010				
AREM WETLAND SCORES FOR EQIP PRIORITY APPLIED CONTRACTS						**CONTRACTS NOT APPLIED**			
Field	ACRES	EXISTING	APPLIED	NET CHANGE	WETLAND TYPE	Field	ACRES	EXISTING	WETLAND TYPE
1	4	1.66	3.88	2.22	LAC/PEM Complex	27	4.8	3.18	PEM/PSS
2	2	0.25	0.69	0.44	LAC/PEM Complex	30	7.6	11.64	PSS/RUPe
3	2		1.7	1.7	LAC	31	14	18.49	PSS/RUPe
4	1		1.2	1.2	LAC	32	6	11.08	PSS/RUPe
5	1.5	0.16	0.87	0.71	LAC/PEM Complex	34	.25	.09	PEM/PSS
6	0.5		0.13	0.13	LAC	35	2.7	2.22	PEM/PSS
7	2.9	0.69	0.95	0.26	LAC/PEM Complex	36	12	18.35	PEM
8	2.1	1.95	2.59	0.64	LAC/PEM Complex				
9	1.7	0.905	1.09	0.185	LAC				
10	0.2	0.128	0.128	0	PEM				
11	15	10.19	10.74	0.55	LAC/PEM Complex				
12	1	0.19	0	-0.19	PEM				
13	4.2	2.1	2.1	0	PEM/LAC Complex				
14	0.54	0.068	0	-0.068	PEM				
15	4.99	8.82	10.95	2.13	PEM				
16	0.25	0.267	0.267	0	PEM/LAC Complex				
17	1.4	0.18	0	-0.18	PEM				
18	26.6	52.14	56.59	4.45	PEM/LAC Complex				
19	.8	.025	0	-0.025	PEM				
20	2.04	.45	0	-0.45	PSS				
21	20.7	9.59	10.874	1.28	PEM				
22	12.7	13	0	-13	PEM/PSS				
23	1.8	2.57	0	-2.570	PEM/PSS				
24	4.1	3.79	4.62	0.83	PEM				
25	30.6	55.83	62.052	6.22	PSS				
26	12	18.35	23.05	4.7	PEM				
28	2.3	4.26	8.44	4.180	PEM/PSS				
29	2	1.82	3.88	1.820	PEM/PSS				
33	6	7.79	10.35	2.360	PEM				
				0					
				0					
				0					
				0					
Total				19.522					

DISCUSSION & CONCLUSION:

Interest in developing and enhancing habitat for wildlife has leveled off. True agriculturists are putting more time and money into improving their irrigation systems in order to improve profitability. The currant economy seems to be dictating personal priorities. Many small landowners can't afford today's prices. Those that are working with us are interested in making it easier and more efficient to irrigate their small acreages and are moving towards intensive local market (farmers market) agriculture.

Right now our level of replacement is adequate if we can offset some of losses in the McElmo Unit with some of the gains in the Mancos Unit. We do need to target larger or greater numbers of projects in the future that focus on wildlife habitat if we continue to fund large canal rehabilitation under salinity. The losses to habitat on these types of projects are far more significant than any of the losses from on-farm. Currently the local irrigation company is accelerating implementation of these large canal piping projects using outside grant money and stimulus money and the losses to cottonwood and willow habitat are extensive. However, they are beginning to request financial assistance from NRCS for these types of projects. We have already seen a large Great Blue Heron Rookery displaced due to such a project in which NRCS was financially involved in.